

## GUIDE SPECIFICATION

### SECTION 23 81 23: COMPUTER-ROOM AIR-CONDITIONERS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes HK horizontal series ceiling mounted, packaged and split computer-room air conditioning units with the following components and accessories:
  - 1. Cabinet
  - 2. Direct Expansion DX System
  - 3. Coils
  - 4. Electric Heat
  - 5. Humidifier
  - 6. Fans
  - 7. Motors
  - 8. Electrical
  - 9. Controls
  - 10. Accessories

##### 1.2 RELATED SECTIONS

- A. Division 01 Specification Sections
- B. Section 23 05 00 – Common Work Results for HVAC.
- C. Section 26 05 00 – Common Work Results for Electrical.
- D. Section 23 09 93 – Sequences of Operation for HVAC Control.

##### 1.3 SUBMITTALS

- A. Submit documentation as required under Division 01.
- B. Product Data: Manufacturer's technical data for each product to be used, including rated capacities, dimensions, furnished specialties, and accessories.
- C. Shop Drawings: Include details of equipment assemblies, including dimensions, weights, required clearances, components, and locations of field connections.
- D. Maintenance and operation information and instructions.

##### 1.4 QUALITY ASSURANCE

- A. Comply with requirements of authorities having jurisdiction and all applicable codes at the location of the project.
- B. Manufacturer Qualifications: Minimum 10 years' experience manufacturing similar products.

- C. Installer Qualifications: Minimum 2 years' experience manufacturing similar products.

#### 1.5 RECEIVING AND STORAGE

- A. Inspect product immediately upon delivery, note and report any damage or missing components.
- B. Handle the product in a manner to avoid damage at all times.

#### 1.6 WARRANTY

- A. Provide manufacturer's standard limited warranty: 1 year (18 months from date of bill of lading).
  - 1. Compressors: 5 years.

### PART 2 - PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

- A. HK™ Horizontal series ceiling mounted computer-room air conditioning units. Systems are configured for ceiling mounted applications with ducted supply and return.

#### 2.2 MANUFACTURERST

- A. Manufacturers:
  - 1. AboveAir Technologies, located at 5179 Mountville Road, Frederick, MD 21703; Tel (301) 874-1130; [www.abovair.com](http://www.abovair.com); sales@aboveair.com
- B. Substitutions: Not permitted.

#### 2.3 [AIR-COOLED] [WATER-COOLED], [PACKAGED] [SPLIT], CEILING MOUNTED HK HORIZONTAL AIR CONDITIONING UNIT.

- A. Design Capacities:
  - 1. Supply Air Fan
    - a. Airflow: **<Insert Value>** CFM.
    - b. Static Pressure: **<Insert Value>** inches w.g.
    - c. Number of Fans: **<Insert Value>**.
    - d. Motor Power: **<Insert Value>** kW.
  - 2. Evaporator Coil **<Delete if not required>**
    - a. Total Cooling Capacity: **<Insert Value>** Btu/h.
    - b. Sensible Cooling Capacity: **<Insert Value>** Btu/h.

- c. Entering Air Dry Bulb Temperature: **<Insert Value>** deg F.
  - d. Entering Air Wet Bulb Temperature: **<Insert Value>** deg F.
3. **[Chilled Water] [Dual cool] [Freecooling] Coil <Optional, delete if not required>**
- a. Total Cooling Capacity: **<Insert Value>** Btu/h.
  - b. Sensible Cooling Capacity: **<Insert Value>** Btu/h.
  - c. Entering Air Dry Bulb Temperature: **<Insert Value>** deg F.
  - d. Entering Air Wet Bulb Temperature: **<Insert Value>** deg F.
  - e. Entering Water Temperature: **<Insert Value>** deg F.
  - f. Leaving Water Temperature: **<Insert Value>** deg F.
  - g. Water Flow: **<Insert Value>** GPM.
  - h. Water Pressure Drop: **<Insert Value>** ft w.g.
  - i. **[Ethylene] [Propylene]** Glycol: **<Insert Value>**% by volume.
  - j. Design Pressure: **<Insert Value>** psig.
4. Electric Heat **<Optional, delete if not required>**
- a. Capacity: **<Insert Value>** kW.
5. Hot Water Coil **<Optional, delete if not required>**
- a. Capacity: **<Insert Value>** Btu/h.
  - b. Entering Air Dry Bulb Temperature: **<Insert Value>** deg F.
  - c. Entering Water Temperature: **<Insert Value>** deg F.
  - d. Leaving Water Temperature: **<Insert Value>** deg F.
  - e. Water Flow: **<Insert Value>** GPM.
  - f. Water Pressure Drop: **<Insert Value>** ft w.g.
  - g. **[Ethylene] [Propylene]** Glycol: **<Insert Value>**% by volume.
  - h. Design Pressure: **<Insert Value>** psig.
6. Steam Coil **<Optional, delete if not required>**
- a. Capacity: **<Insert Value>** Btu/h.
  - b. Entering Air Dry Bulb Temperature: **<Insert Value>** deg F.
  - c. Steam Pressure: **<Insert Value>** psi.
7. Condenser Fan **<Delete if not required>**
- a. Airflow: **<Insert Value>** CFM.
  - b. Static Pressure: **<Insert Value>** inches w.g.
  - c. Number of Fans: **<Insert Value>**.
  - d. Motor Horsepower: **<Insert Value>**.

8. Condenser Coil (Air-Cooled) <Delete if not required>
  - a. Ambient Air Temperature: <Insert Value> deg F.
  
9. Condenser Coil (Water-Cooled) <Delete if not required>
  - a. Entering Water Temperature: <Insert Value> deg F.
  - b. Leaving Water Temperature: <Insert Value> deg F.
  - c. **[Ethylene] [Propylene]** Glycol: <Insert Value>% by volume.
  - d. Water Flow: <Insert Value> GPM.
  - e. Water Pressure Drop: <Insert Value> ft w.g.
  - f. Design Pressure: <Insert Value> psig.
  
10. Humidifier <Optional, delete if not required>
  - a. Capacity: <Insert Value> lb/hr.
  
- B. Performance requirements:
  1. UL compliance: **[UL Standard 1995, ETL listed] [UL Standard 60335-2-40, ETL listed].**
  2. NFPA compliance: Compliance with NFPA 90A or 90B.
  
- C. Cabinet
  1. Air handling compartment:
    - a. Construction: Single-wall insulated panels installed in recessed pockets with formed frame. Accessible panels shall utilize quarter-turn fasteners. All sheet metal shall be minimum 20 gauge **[with powder-coat paint finish].**
    - b. Insulation and Adhesive.
      - 1) Material: Fiberglass mat (unit panels) and high density closed cell foam (fan bulkhead, piping, and drain pan).
      - 2) Thickness: 1 inch.
      - 3) Adhesive: ASTM C 916, Type I compliant.
    - c. Drain pan: Stainless steel, insulated.
    - d. Air pattern: **[Ducted, Standard Same Face] [Ducted, Mirror-Image Same Face] [Ducted, Straight-thru (ZST)] [Ducted, Mirror-ImageStraight-thru (ZST)] [Ducted, Straight-thru Right-to-left (RLST)] [Ducted, Straight-thru Left-to-right (LRST)] [Ducted, 90°right-angle (left-side return/rear-side discharge)] [Ducted 90°right-angle (left-side return/front-side discharge)].**
    - e. Filter: **[2" Merv-8] [4" Merv-8] [2" Merv-13] [4" Merv-13] [2" Merv-8 (Pre) 4" Merv-13 (Final)].**

2. Condensing compartment (**[Packaged] [Split Air-Cooled Ducted] [Split Air-Cooled] [Split Water-Cooled]**): **<Delete if not required>**
    - a. Construction: Single-wall, heavy gauge galvanized steel.
    - b. Insulation.
      - 1) Material: **[None] [High density 2 lb/f t<sup>2</sup> closed cell foam]**.
      - 2) Thickness: **[None] [1 inch]**.
      - 3) Adhesive: **[None] [ASTM C 916, Type I compliant]**.
    - c. Air pattern: **[None] [Vertical, Free Discharge] [Ducted, Same Face] [Ducted, Mirror-Image] [Ducted, Straight-thru (ZST)] [Ducted, 90°right-angle In-Front/Out-Right] [Ducted, 90°right-angle, In-Rear/Out-Right]**.
- D. Direct expansion cooling **[and dehumidifying]** system. **<Delete if not required>**
1. Compressor(s): **[Single] [Dual]** circuit **[fixed-speed] [2-speed] [lead digital]** scroll.
    - a. Refrigerant: **[R-410A] [R-454B]**
    - b. Overload protected
    - c. Location: **[Installed with Evaporator] [Installed in remote condensing unit]**.
  2. High refrigerant pressure safety switch.
  3. Low refrigerant pressure safety switch.
  4. **[R-454B Refrigerant Detection Safety]**
  5. Crankcase heater.
  6. Thermal expansion valves with external equalizer.
  7. Capacity control: **[None] [Hot gas bypass] [Hot gas bypass & quench]**.
  8. Low ambient control option: **[None] [0°F Fan Cycling] [-20°F Variable Speed Blower] [-30°F Flooded head pressure control valve] [45°F Low entering water temperature kit]**.
  9. Additional options: **[None] [Receiver] [Insulated & Heated Receiver] [Suction line accumulator] [Sound jacket]**.
  10. Packaged system: The unit shall include Type L-ACR refrigerant piping, Schrader valves, factory-installed filter-drier(s), and factory-installed sight glass(es). The unit shall ship from the factory with a refrigerant charge. The installing contractor shall verify operation and supply any additional refrigerant as necessary for the installed conditions.
  11. Split system: The unit shall include Type L-ACR refrigerant piping and Schrader valves. Filter-drier(s) and sight-glass(es) shall be shipped loose for field installation. The unit shall ship with a factory nitrogen charge. Field relief of the nitrogen charge shall indicate that the unit was received in a leak-free state. The installing contractor shall be responsible for all interconnecting piping, isolation valves, leak testing and evacuating the combined system, and charging the system. Refrigerant shall be provided by the installing contractor.

E. Coils

1. Evaporator Coil: <Delete if not required>
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: **[3][4][5][6]**.
  - c. Fins: 12 fpi.
  - d. Coating: **[None] [Heresite] [Electrofin] [HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
2. Hot Gas Reheat Refrigerant Coil: <Optional, delete if not required>
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: 1.
  - c. Fins: 12 fpi.
  - d. Coating: **[None] [Heresite]**.
  - e. Valve type: Factory installed **[snap acting 3-way hot gas reclaim valve] [modulating 3-way hot gas reclaim valve]**.
3. **[Chilled Water] [Dual cool] [Freecooling]** Coil: <Optional, delete if not required>
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: **[3][4][6]**.
  - c. Fins: 12 fpi.
  - d. Coating: **[None] [Heresite]**.
  - e. Valve type: Valve type: Modulating, **[Factory-installed] [Field-installed], [2-way] [3-way]**.
  - f. Valve pressure rating: 580 psig.
4. Condenser Coil (Air-Cooled, Ducted): <Delete if not required>
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Coating: **[None] [Heresite]**.
5. Condenser Coil (Air-Cooled, Free-Standing): <Delete if not required>
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Coating: **[None] [Heresite]**.
6. Condenser Coil (Water-Cooled): <Delete if not required>

- a. Construction: **[Water-cooled coaxial condenser] [Brazed plate condenser]**.
  - b. Valve type: **[Factory-installed, 2-way] [Factory-installed, 3-way]**.
  - c. Valve pressure rating: **[150 psig] [580 psig]**.
  - d. Flow proving switch: **[None] [Wet-wet differential pressure switch (200 psig rated)] [Paddle-type Flow Switch]**.
7. Hot Water Heat: **<Optional, delete if not required>**
- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: 1
  - c. Fins: 12 fpi.
  - d. Coating: **[None] [Heresite]**.
  - e. Valve type: Modulating, field-installed, **[2-way] [3-way]**.
  - f. Valve pressure rating: 580 psig
8. Steam Heat: **<Optional, delete if not required>**
- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: 1
  - c. Fins: 12 fpi.
  - d. Coating: **[None] [Heresite]**.
  - e. Valve type: Modulating, Field-installed, 2-way
- F. Electric Heat **<Optional, delete if not required>**
- 1. Elements: Stainless steel, finned-tube type mounted in galvanized steel frame.
  - 2. Over Temperature Protection: Disk -type, automatic reset thermal cut-out **[and disk-type, manual reset thermal cut-out]**.
  - 3. Control: **[Single stage] [Two stages] [SCR control]**.
- G. Humidifier **<Optional, delete if not required>**
- 1. Electrode steam canister type humidifier with disposable canister, steam distributor, and fill and drain valves.
  - 2. Control: **[Single stage] [Modulating]** with automatic flush cycle.
- H. Fans
- 1. Supply fan:
    - a. Type: Backward-inclined, high efficiency impeller.
    - b. Motor: Direct drive, EC.

- c. Direct Drive: Motor mounted resiliently in the fan inlet.
  - d. Fan/motor assembly shall be statically and dynamically balanced for quiet, vibration-free operation
- 2. Condenser fan (Ducted Condenser): ~~<Delete if not required>~~
  - a. Type: Backward-inclined, high efficiency impeller.
  - b. Motor: Direct drive, EC.
  - c. Direct Drive: Motor mounted resiliently in the fan inlet.
  - d. Fan/motor assembly shall be statically and dynamically balanced for quiet, vibration-free operation.
- 3. Condenser fan (Free-standing Condenser): ~~<Delete if not required>~~
  - a. Type: Axial propeller.
  - b. Motor: **[Direct drive, split capacitor] [Direct drive, EC].**
- I. Motors
  - 1. Motor sizes: As indicated herein, or such that the motor will not be required to operate in service factor range above 1.0.
  - 2. Motor Bearings: Maintenance free through lifetime lubricated ball bearings.
  - 3. Efficiency: Premium or better.
- J. Electrical
  - 1. Unit short-circuit current rating: 5 kA.
  - 2. Air handling compartment disconnect: Field-mounted, **[fused] [non-fused].**
  - 3. Condensing compartment disconnect: **[Factory-mounted] [Field-mounted], [fused] [non-fused].**
  - 4. Air handling compartment power connection: Single point power.
  - 5. Condensing compartment power connection: Single point power.
  - 6. Control power: 24VAC.
  - 7. Electrical protection: **[None] [Voltage/Phase Monitor].**
- K. Controls
  - 1. Microprocessor based PLC controller.
    - a. Control type: **[MC-2000S, BACnet/Modbus Enabled Controller for Computer-Room DX systems] [MC-6000S, BACnet/Modbus Enabled Controller for Computer-Room CHW Systems].**
    - b. Controller: Modicon programmable DIN-rail mounted HVAC controller.
    - c. Unit-Mounted display terminal with push button navigation.
    - d. Sensors: ~~<Delete all sensors not required>~~



- 1) Field mounted, return air **[temperature] [temperature/humidity]** sensor.
  - a) Temperature: NTC Thermistor,  $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ .
  - b) Humidity: 4-20 mA,  $\pm 3\%$  20-80% RH @  $77^{\circ}\text{F}$ .
- 2) Field mounted, supply air temperature sensor.
  - a) Temperature: NTC Thermistor,  $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ .
- 3) Wall mounted **[temperature] [temperature/humidity]** sensor.
  - a) Temperature: NTC Thermistor,  $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ .
  - b) Humidity: 4-20 mA,  $\pm 3\%$  20-80% RH @  $77^{\circ}\text{F}$ .
- 4) Wall-/Plenum-mounted static pressure sensor.
  - a) Differential Pressure: 4-20 mA, 0-1.0" w.c.,  $\pm 0.5\%$  full scale.
- 5) Duct-mounted static pressure sensor.
  - a) Differential Pressure: 4-20 mA, 0-5.0" w.c.,  $\pm 0.5\%$  full scale.
- 6) Duct mounted outdoor air **[temperature] [temperature/humidity]** sensor.  
**<Airside economizer only>**
  - a) Temperature: NTC Thermistor,  $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ .
  - b) Humidity: 4-20 mA,  $\pm 3\%$  20-80% RH @  $77^{\circ}\text{F}$ .
- 7) Duct mounted return air [temperature] [temperature/humidity] sensor.  
**<Airside economizer only>**
  - a) Temperature: NTC Thermistor,  $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ .
  - b) Humidity: 4-20 mA,  $\pm 3\%$  20-80% RH @  $77^{\circ}\text{F}$ .
- e. BMS communication: User selectable BACnet MSTP, BACnet IP, and Modbus.
- f. Multi-unit Sequencing: [Local CANbus Network for up to 10 units] [Local Modbus Network for up to 32 units].

L. Accessories

1. Condensate pump: **[None] [Medium Profile, 2.5 quart tank, 22 ft lift] [Large profile, 1 gallon tank, 20 ft lift, cast aluminum rated for 150°F] [Large profile, 1 gallon tank, 50 ft lift] [Large profile, 1 gallon tank, 50 ft lift, cast aluminum rated for 212°F]**.
  - a. Dual internal float switches.
  - b. Condensate pump mounting: Field Mounted.
  - c. Condensate pump power: **[115V] [Fused connection at unit]**.

2. Smoke detector: **[None] [Field, duct mounted]**.
3. Firestat: **[None] [Field, duct mounted]**.
4. Water-leak detector: **[None] [Probe-type] [Cable-type]**.
5. Vibration isolation: **[None] [Hanging spring vibration isolators]**.
  - a. Adjustable, sized for distributive weight of the unit with 1" defelection
6. Hose Kit: **[None] [36 inch flexible stainless-steel hose kit with shut-off valves, strainer, manual air vent, and <automatic> <manual> balancing valve]**.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the area and conditions where the unit will be installed for compliance with the installation requirements for the unit before equipment installation.
- B. Verify roughing-in for unit(s) is coordinated with actual locations of piping, duct, and electrical connections before equipment installation.
- C. Do not install equipment until unsatisfactory conditions are remedied.

### 3.2 INSTALLATION

- A. Install unit in accordance with manufacturer's requirements and approved documentation.
- B. Complete all ductwork, refrigerant piping, control, power wiring, and other service connections in accordance with Division 23 and Division 26.
- C. Verify unit has been leak checked in accordance with manufacturer's requirements and provided with an appropriate starting charge when breaking vacuum.
- D. Prepare inspection report confirming that the unit is ready for startup.

### 3.3 STARTUP AND FIELD QUALITY CONTROL

- A. Engage a factory-authorized service representative to test and inspect components, assemblies, equipment installation, and final connection.
- B. The factory-authorized service representative shall complete all tests as required by the manufacturer.
- C. Prepare and submit startup report to manufacturer.

### 3.4 CLEANING AND PROTECTION

- A. Protect unit from damage during construction operation. Do not leave access doors open or allow debris to accumulate in the unit. Promptly repair or remove and replace any damaged materials.
- B. After completing system installation and testing, balancing, and adjustments, clean unit and replace filters.

3.5 DEMONSTRATION

- A. Engage a factory-authorized representative to train owner's maintenance personnel to adjust, operate, and maintain the unit.

**END OF SECTION 23 81 23**